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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|----------------------|------------------|
| 10/664,665 | 09/18/2003 | Akram Ali Salman | 2000.111200 | 4618 |
| 23720 | 7590 | 12/29/2005 | EXAMINER | |
| WILLIAMS, MORGAN & AMERSON 10333 RICHMOND, SUITE 1100 HOUSTON, TX 77042 | | | SCHILLINGER, LAURA M | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2813 | |

DATE MAILED: 12/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/664,665

Applicant(s)

SALMAN ET AL.

Examiner

Laura M. Schillinger

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-84 is/are pending in the application.
- 4a) Of the above claim(s) 19-84 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 and 18 is/are rejected.
- 7) ☒ Claim(s) 17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

Claim 17 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-16, 18 are rejected under 35 U.S.C. 102(e) as being anticipated by Lin ('729).

Lin teaches the following claimed limitations as cited below :

1. A method, comprising:

providing a device having a dielectric layer (Col.2, lines: 38-46);

applying a plurality of constant voltage pulses to said device (Col.2, lines: 45-50); and

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determining a time-to-breakdown for said dielectric layer based a count of the number of pulses applied to said device to break down said dielectric (Col.3, lines: 1-5).

2. The method of claim 1, further comprising measuring a current through said dielectric layer after one or more of said constant voltage pulses has been applied (Col.2, lines: 45-51).

3. The method of claim 1, further comprising measuring a current through said dielectric layer after each of said plurality of constant voltage pulses has been applied (Col.2, lines: 45-51).

4. The method of claim 1, wherein said time-to-breakdown is determined based upon a measurement of current flowing through said dielectric layer, said current being measured after one or more of said constant voltage pulses has been applied (Col.3, lines: 1-6).

5. The method of claim 1, wherein said device is comprised of at least one of a transistor, a capacitor, a resistor and a memory cell (Col.1, line: 30).

6. The method of claim 1, wherein said dielectric layer is comprised of silicon dioxide or a material having a dielectric constant greater than 5 (Col.3, line: 41-gate oxide).

The method of claim 1, wherein said constant voltage pulses have a voltage that ranges from approximately 4-5 volts (Col.2, lines: 50-60).

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The method of claim 1, wherein said pulses have a constant pulse width (Fig.4- note that the pulse width of the current are shown to have a constant width and due to the ($V=IR$)- the voltage would necessarily also have a constant pulse width).

9. The method of claim 1, wherein said pulses have a constant pulse width of less than 1 usec (Col.2, lines: 60-65).

10. The method of claim 1, wherein said pulses have a constant pulse width of approximately 100 ns (Col.2, lines: 60-65).

11. The method of claim 2 or 3, wherein said step of measuring said current through said dielectric layer is performed using an applied voltage of approximately 1-2 volts (Col.2, lines: 50-60).

12. The method of claim 1, wherein said device is a transistor and said dielectric layer is a gate insulation layer for said transistor (Col.2, lines: 35-45).

13. The method of claim 1, wherein said dielectric layer is an interlevel or intralevel dielectric layer of a conductive interconnection structure (Col.2, lines: 35-45- a gate oxide is considered an interlevel dielectric).

14. The method of claim 1, further comprising: determining at least one parameter of a process operation to be performed to form a dielectric layer on at least one subsequently processed substrate based upon said determined time-to-breakdown (Col.3, lines: 8-17).

15. The method of claim 14, further comprising: performing said process operation comprised of said determined at least one parameter on said at least one subsequently processed substrate to form said dielectric layer above said at least one subsequently processed substrate (Col.3, lines: 8-17).

16. The method of claim 14, wherein determining said at least one parameter comprises determining at least one of a temperature, a pressure, a duration, a process gas composition, a process gas concentration, and an applied voltage of said at least one process operation (Col.3, lines: 8-17- applied voltage).

18. The method of claim 1, wherein said device is part of a test structure formed on a semiconducting substrate (Col.4, lines: 10-15).

Allowable Subject Matter

The following is a statement of reasons for the indication of allowable subject matter:

In reference to claim 17, prior art of record fails to teach the limitations of claim 14 in combination with the limitation of claim 17 wherein at least one process operation comprises at

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least one of a deposition process, a thermal growth process and a nitridation process.

Consequently, claim 17 contains allowable subject matter.

Response to Arguments

Applicant's arguments filed 9/14/05 have been fully considered but they are not persuasive. Applicant argues that Lin fails to anticipate Applicant's claim language because Lin teaches to apply different voltage amounts to breakdown a dielectric and therefore fails to teach a "constant" voltage as claimed by the Applicant. However, such an argument is not persuasive, because claim language is afforded the broadest reasonable interpretation and a constant voltage pulse claimed by the applicant is interpreted by the Examiner to be a square-wave pulse, where the voltage does not vary in amount. Each pulse does not vary in amount, that is the voltage is not sinusoidal or some other varying voltage pulse, each pulse itself is constant.

Applicant argues that dependent claims 2 and 3 are not anticipated because Lin does not teach measuring current, this is not persuasive (Box 30, Fig.5).

Applicant argues that Lin fails to teach determining a parameter of a process based upon the determined time to breakdown, this is also not persuasive because the voltage/current is increased determined by the time to breakdown

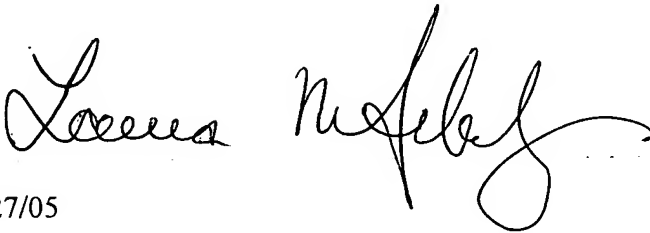
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura M. Schillinger whose telephone number is (571) 272-1697. The examiner can normally be reached on M-T, R-F 7:00-5:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Laura M Schillinger
Primary Examiner
Art Unit 2813

12/27/05